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EXAMINER	
CLARK, GREGORY D	

ART UNIT	PAPER NUMBER
1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/518,923	BUREAU ET AL.	
	Examiner	Art Unit	
	GREGORY CLARK	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10/01/2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) *1-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Detailed Office Action

1. The examiner acknowledges receiving the applicant's amended claims dated 10/01/2009. Claims: 22-30 (previously presented), 1-22 (cancelled).

Claim Rejections - 35 USC § 103

2. Claims: 22-30 (previously presented), 1-22 (cancelled).The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 23-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bertrand (WO 2002/098926) in view of Guiseppi-Elie (5,766,934).**

4. **Regarding Claim 23**, Bertrand teaches electro-grafting a strong adherent polymer coating on an electrically conductive surface comprising an electrochemical grafting at the surface of an active monomer (comprising a reactive functional group for attachment of a molecule having at least one complementary reactive group) (Page 5, lines 8-11). Bertrand does not teach electrografting resulting in 90% of the total

functional groups being accessible and that the density of accessible functional groups of interest is between 10^4/micron^2 and 10^{10}/micron^2.

The examiner notes the that the applicant indicates in the specification that the accessible groups of interest of the coating used will be sufficient in number to adapt as well as possible to the steric constraints, and more generally to the topology, of the object that it is desired to attach to this coating.

Bertrand does not specifically mention 90% accessibility of functional groups or the density of accessible functional groups of interest is between 10^4/micron^2 and 10^{10}/micron^2.

It would have been obvious to one having ordinary skill in the art at the time of the invention to have carried out an electrografting process by adjusting the level of the "functional group containing species" and the density of such species to account for the expected steric constraints (crowding of the functional groups limit reactivity) to produce the desired percentage of functional group accessibility and density.

It has been held that discovering an optimum value (accessibility and density of functional groups) of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2nd 272, 205 USPQ 215 (CCPA 1980).

Bertrand further teaches electrografted coatings of polymers such as polyhydroxyethylacrylate can be deposited on the conducting substrates with a strong adhesion and an increased and tunable thickness (controllable thickness) (page 9, lines 18-20). Bertand fails to teach a density of 10^4/micron^2 to 10^{10}/micron^2 for accessible functional groups.

Guiseppi-Elie teaches electropolymerization providing a unique and convenient method for precise control of polymer film thickness by control of the electropolymerization charge density (column 2, lines 46-55).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to combine Bertrand with Guiseppi-Elie because Guiseppi-Elie provides a method for precise control of polymer film thickness which leads to convenient surface functionalization by subsequent blending with other molecules such as polypeptides. (Column 2, lines 57-61).

Moreover, it would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the density for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2nd 272,205 USPQ 215 (CCPA 1980).

5. **Regarding Claim 24**, Bertrand teaches the use of monomers with a reactive functional group toward nucleophilic compounds. The reactive functional group may be for example a succinimidyl group particularly reactive towards amines or epoxy, a vinyl, an allyl, an aryl, a chloride group or a combination of them (page 13, lines 1-3). When the reactive functional group is part of a preformed polymer, the monomer becomes a macromonomer bearing at least one activated vinylic pendant group (acrylic or methacrylic function) which allows formation of new primer by one-step electrografting of a reactive polymer called macromonomer (page 5, line 28-32).

6. **Regarding Claim 25**, Bertrand teaches grafted activated vinyl monomers can undergo controlled or uncontrolled ring opening polymerization (referred to by the applicant as molecules that are cleavable by nucleophilic attack) (page 8, lines 23-31).

7. **Regarding Claim 26**, Bertrand teaches electro-reactive species in the form or acrylates and methacrylates containing an anchoring group (labeled as the X group in diagram page 5) that can be electrografted to conductive surfaces (page 5, lines 7-31). Betrand mentions glycidyl methacrylate as one of the monomers used in electrografting (page 9, line 9).

8. **Regarding Claim 27**, Bertrand teaches the use of lactones and lactides such as (e-caprolactone), and functional caprolactones such as g-bromo- e-caprolactone, or lactide such as D, L-Lactide or any other polymerizable cyclic monomer such as cyclic anhydride (page 9, lines 1-4). The examiner notes that these materials are cleavable by nucleophilic attack.

9. **Regarding Claim 28**, Bertrand teaches grafting a molecule or macromolecule with a complementary functional group to the surface via polycondensation or polyaddition which include: proteins, enzymes, oligonucleotides, drugs, dyes, or small organic molecules of particular interest like electroactive molecules (aminoferrocene), vitamin (biotine), and ligands (page 13, lines 10-18).

10. **Regarding Claim 29**, Bertrand teaches electrografting reactions on steel, stainless steel, Inox316L, tantalum, titanium, nitinol carbon, ITO glass, transition metal (Fe, Ni, Cu, Au, and Ag), metal doped polymers (page 6, lines 30-32).

11. **Regarding Claims 30**, Betrand teaches electrografied acrylates or methacrylates (organic precursors) containing an anchoring group for attachment of a molecule having at least one complementary reactive group (page 5, lines 20-26). The process allows the grafting onto the initial coating (adhesion primer) by compounds like functional polymers such as, protein, peptide, oligonucleotide (defined as DNA chips, page 4, line 28), dyes, drugs, and anti-bacterian compounds (page 6, lines 9-11).

Betrand also mentions the use of monomeric species which do not have reactive functional groups such as polystyrene (page 8, line18) and (page 22, lines 12-28). Betrand fails to mention a formulation composed of a mixture of monomers with and without a reactive functional group.

The applicant indicates in the specification that the accessible groups of interest of the coating used will be sufficient in number to adapt as well as possible to the steric constraints, and more generally to the topology, of the object that it is desired to attach to this coating. The use of monomers that do not have reactive functional groups is viewed as an obvious means to control the degree of steric crowding. Functionalized substrates with an excessive amount of surface coverage by species with reactive functional groups would be expected to result in steric crowding of the reactive groups leading to a decrease in accessibility with respect to the subsequent grafting of vicinal

bio-molecules. Balancing the monomer ratio of reactive versus non-reactive groups would be an obvious means to control steric crowding.

In essence, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have formulated a mixture of monomers with and without reactive groups to ensure that a suitable percentage of reactive groups were accessible during the subsequent grafting of vicinal bio-molecules.

Response to Arguments

The applicant argues that the prior art does not teach the use of monomeric species that do not contain reactive functional groups, the number of functional groups of accessible functional groups and the density of the functional groups of interest.

The examiner counters with the fact that Bertrand teaches the deposition of styrene (monomer contains no reactive group) on conductive surface (page 22, lines 12-28).With respect to accessible functional groups and the density of the functional groups of interest, it would have been obvious in the electrografting process to adjust the level of the "functional group containing species" which would affect the density of such species in order to account for the expected steric constraints (crowding of the functional groups limit reactivity) to produce the desired percentage of functional group accessibility and the ultimate density of the reactive groups. As the prior art teaches the grafting of bio-molecules that are the same or in similar categories to those claimed by the applicant, it would have been obvious to one of ordinary skill in the art at the time of the invention to have conducted routine experiments to determine the appropriate level

of reactive group containing monomer to ensure a suitable level of grafting which would have included the claimed accessibility and density ranges.

Sequence Rule Compliance

This application contains sequence disclosures that are encompassed by the definitions for nucleotide and/or amino acid sequences set forth in 37 CFR 1.821(a)(1) and (a)(2). However, this application fails to comply with the requirements of 37 CFR 1.821 through 1.825 for the following reasons. Sequences appear at page 38, line 15, page 42, lines 14 and 20 and a paper copy of a sequence listing was submitted December 23, 2004 but no computer readable form has been submitted.

Help with compliance with the sequence rules is available from Robert Wax, SPE of Art Unit 1615 whose number is (571) 272-0623.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794

/GREGORY CLARK/GDC/
Examiner, Art Unit 1794